

Andover & Wilmington
Rail Road
Report

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FIRST REPORT

OF THE

DIRECTORS

OF THE

ANDOVER AND WILMINGTON

RAIL ROAD CORPORATION,

WITH THAT OF

THE ENGINEER.

OCT. 21, 1834.

ANDOVER:

GOULD AND NEWMAN.....PRINTERS.

1834.

REPORT.

To the Stockholders of the Andover and Wilmington Rail Road Corporation.

GENTLEMEN:

It having been considered inexpedient to make a formal report previous to the last annual meeting, the present Board of Directors have now the honor to present to you a statement, somewhat in detail, of the proceedings of the Directors from the first organization of the Corporation, which was in June, A. D. 1833.

The first measure of importance taken by your Directors was to procure an Engineer to make such surveys and estimates as were necessary, to enable the subscribers to the stock to decide on the practicability and expediency of the undertaking.

In selecting an Engineer, it was an object to obtain a gentleman of experience and of high professional attainments, whose report would be entitled to your full confidence. This was found to be a more difficult task than was at first apprehended—Engineers being at this time much engaged in similar projects.

Patrick T. Jackson, Esq., the Agent for the Lowell Rail Road, who had on many occasions aided your Directors by his friendly advice, recommended Col. Loammi Baldwin for this service. It was thought important to obtain this Gentleman, so celebrated in this and other states, as a civil Engineer.

Col. Baldwin was applied to in August, and he agreed to assist us as far as he could, consistently with his duties to the government, and previous engagements to other individuals. He came and viewed the several proposed routes, and on the fifth of September, he commenced the surveys, accompanied by four young gentlemen under his tuition, and with other necessary aid furnished him by your Directors. Col. Baldwin superintended the work the two first days, and then left it in charge of Mr. Pratt, his most experienced Engineer.

The first line was commenced at the Bridge over the Lowell Rail Road, near Col. Jaques' store in Wilmington, thence following the Andover Road, as far as Richardson's house, near Wilmington Meetinghouse; thence bearing westerly, and passing the west side of said Meetinghouse; thence northerly over the low ground and Lubber Brook to the Salem and Tewksbury Road, about forty rods to the west of the house of William Blanchard, Esq.; thence crossing said Road and continuing the same direction over said Blanchard's farm and the Harnden farm, to the west Andover and Wilmington Road, near Thomson's house; thence crossing said Road and continuing about the same direction and on the easterly side of said Road, leaving Thomson's house about twenty rods to the west; then bearing a little to the west, and crossing said Road again, and passing over the farm of William Burt about four rods westerly of Burt's house; thence to the valley of Chandler's Brook (or Foster's Pond Brook) then bearing easterly on the side of the hill near the line between Andover and Wilmington, to the Meadow on said Brook; thence over said Meadow, crossing said Brook about forty rods westerly of the Chandler's bridge, and so about the same direction over Mears' Plain to the head of said Plain, near the house of Isaac Goldsmith, Jr.; thence crossing the old Boston and Haverhill Road, and bearing more northerly over land of Nehemiah Abbot and land of Ezra Abbot and others, nearly parallel to the general course of said road, to a point in the Road behind Mr. Locke's Tavern, near the house of Peter French. The length of this line is $7\frac{8}{10}$

miles. Rise from Lowell Rail Road at Jaques' Bridge, 71 $\frac{37}{100}$ feet. This is called the Western Route.

The other line run by Mr. Pratt commenced at the Bridge over the Lowell Rail Road on the east Boston and Haverhill Road, about one mile lower down on the Lowell Rail Road than Jaques' Bridge; thence a little to the east of north on the easterly side of the valley of maple meadow Brook, about one and a half miles, where the line crosses said Brook; thence near the same course about one half a mile, to Lubber Brook; thence crossing said Brook in the same course, about three fourths of a mile, to the last mentioned road; thence crossing said Road, and bearing a little more easterly, and passing about three rods easterly of Gowen's buildings, so on about five eighths of a mile to the Salem and Tewksbury Road, about fifty rods to the east of the house of Doctor Brown. Thence nearly a straight line, about one mile and three fourths, following the general direction of the Boston and Haverhill Road, and a few rods easterly of it, to the Low Ground between Foster's Pond and said Road; thence more westerly, following the course of said Road, and keeping on the high ground near the same, about one fourth of a mile; thence taking a more easterly direction, about three eighths of a mile, to a mill dam on the brook, the outlet of Foster's Pond; thence more northerly, near a straight line, about seven eighths of a mile, to the Road near Capt. Job Abbot's house; thence still more northerly and a little to the west of north, about three fourths of a mile, passing near Capt. J. Hayward's buildings, to station numbered 116, and the letter D on the Plan of the West route; and this is called the East Route.

Mr. Pratt completed a plan of these two routes and profiles of the same, under the Direction of Col. Baldwin; and when he had got thus far, he was obliged to accompany Col. Baldwin to Norfolk, on business of the government.

These plans are herewith exhibited, and may be seen at any time by calling on the Directors.

Col. Baldwin has expressed an opinion of these routes in a letter dated Oct. 10, 1833, as follows—

Charlestown, Oct. 10, 1833.

DEAR SIR,

I regret that my engagements require my going to Norfolk before more extensive views and surveys for the Branch Rail Road from Wilmington to Andover can be made. Mr. Pratt, who has made the surveys under my direction, must also accompany me to Norfolk, on business of the Docks; but he will be able so far to complete his plan and profile of the surveys of what are called the Western and Eastern routes, before he goes, as to enable you and other members of the Board of Directors to understand the nature of the lines already surveyed, and to judge how far more favorable ground can be found for future trials.

From the view I have taken, in company with you and other gentlemen interested in the inquiry, and from having personally attended two days in the commencement of the survey, I have no doubt, a highly favorable route for the contemplated road may be found, and even much more so than, on my first view, I had supposed.

The whole distance on the first line surveyed, from the Lowell road, by Jaques' Bridge in Wilmington, marked A on the plan, to a point in the road behind Locke's Tavern in Andover, marked B, is 7.80 miles, and the rise 71.37 feet. This is called the Western Route.

On what is called the Eastern route, the point of the Lowell road from which the survey was commenced, is at the Bridge on the East Boston road in Wilmington, marked C, and falls into the Western line at station 116, marked D, in a distance 7.52 miles, rising 64.10 feet, and from this last point to the end of the Western route at B, the distance is 1.11 miles and the rise is 17.98 feet, thus making the whole of the Eastern route, embracing the upper part of the Western route, 8.63 miles, and the rise 82.08 feet. This additional length and rise of the East route is principally owing to its beginning about a mile lower down on the Lowell road at a point about 10 feet lower than at Jaques'.

The first survey was begun at Jaques', as an arbitrary point for a trial survey only, and was never considered as the most eligible route. Indeed the lower part of this route is too low, and will not be adopted. But I have no doubt, that pursuing the general course of the Eastern line as far as, or to the neighbourhood of a point marked E, then crossing over more favorable ground, perhaps a little East of Mr. Blanchard's, into the line of the Western route in the neighbourhood of F, much more eligible, and indeed highly favorable ground may be found, and from F pursue the general course of the remainder of the Western route to Andover.

Upon the whole, the appearances and character of the country over which this Rail Road is contemplated, are very favorable to the project. There are but two points on the line which I consider embarrassments, and these are the two vallies at Chandler's brook, and at Goldsmith's house. But a more favorable direction for crossing Chandler's brook may be obtained than is seen on the plan and profile, while the line at Goldsmith's valley is seen on the plan, perhaps as favorably as one can be chosen. Here the breadth is about 50 rods at 43 feet above the bottom, where it is very narrow. At both places abundant earth for embankment is convenient.

In other respects no expensive works of art are required. No great streams are to be passed; apparently no expensive ledges to be opened; no costly bridges will be required; and all the roads may be passed with facility. There is a sufficient quantity of rock for all requisite purposes near the line of the road, and there is no deep boggy meadow land on the route.

Should you have occasion to address me further on the subject, please to direct to me at *Norfolk, Virginia*, and your letters shall be cheerfully attended to.

With great regard,

Yours truly,

L. BALDWIN.

To HOBART CLARK, Esq.
Andover.

Your Directors were now fully satisfied of the practicability of locating a Rail Road from the Lowell Rail Road in Wilmington, to Andover, on a line nearly straight, and which should be more level than perhaps any Rail Road hitherto projected in our country, of equal length; the Lowell Road only excepted.

An accurate calculation of the expense of building this Road was the next object of inquiry for your Directors. To make this calculation, a skilful and experienced Engineer was indispensably necessary. Your Directors were so fortunate, as to be able to engage Mr. Joshua Barney, an Engineer well qualified and of much experience in this branch of his profession, to perform this service. Mr. Barney came to Andover, and commenced the business on the twelfth day of November last. He examined our plan, viewed both routes, and then began his line at a station in front of Dr. Wardwell's house, on the road between the station near Peter French's house and Andover South Parish Meetinghouse; thence following the general course of the West route, diverging a little to the right and left of it, as the land was found most favorable, but on the whole making this line about as straight as that of the West route, as far as letter F on that route; then taking a more southerly direction, but crossing the Salem and Tewksbury road a few rods westerly of Esq. Blanchard's house; thence over Lubber Brook, and crossing the west Boston and Haverhill Road between the Lubber Brook Bridge and Wilmington Meetinghouse, so on in a straight line passing a few rods to the east of Col. Blanchard's house, and intersecting the Lowell Rail Road about six hundred feet below the Bridge at Col. Jaques'.

Mr. Barney reported to your Directors his plan, calculations and estimates, about the twentieth of January last, all which is herewith exhibited for your inspection.

Also a Lithographic map of the route on a reduced scale is hereto annexed.

It will be seen from the Engineer's report, that calculations have been made to construct this Road in different ways, with double and single tracks, with trench walls or rubble stone, and

with longitudinal sills. It is thought that one set of tracks, with one or more Turnouts, will be sufficient, provided locomotive power is used, which is now considered the cheapest and most expeditious mode of propelling Cars on Rail Roads.

But as it is believed that this is to be the first section from the Lowell Rail Road of a Rail Road to be extended over Merrimac River to Haverhill, and so on through Newhampshire to Maine, it would be best in moving the earth to form the Road bed, to have reference to another set of tracks, to be laid at a future period, so far as can be done with convenience, and without additional expense.

A Road formed for a single track, with Iron rails placed on wood sleepers, and longitudinal sills, is calculated at the sum of \$77,002 20, exclusive of expense of Engineers and other contingencies. Your Directors are of opinion that a Road built in this form would answer the purpose well, and have some advantages over a Road built with a more expensive superstructure. No calculations have yet been made as to the amount required to be paid in damages for land and fences.

It is believed that these expenses must be comparatively small. The country through which the Road will pass is almost entirely agricultural. The farms are large. A considerable proportion of the land is not under improvement except for the growth of wood, and some of it of small value. There are, however, many good Farms on each of the several Routes, which have been examined. And your Directors have reason to expect a liberal release of damage from some of the Farmers on the routes, provided they are accommodated in the location of the road.

It must be apparent to every one acquainted with the routes, that the location of the Road may be varied in many places with perfect convenience, in view of this object.

It may be asked why the report of the doings of the Directors has not been laid before the Stockholders at an earlier period.

The answer to this question is, that in January last, when the annexed report was completed, there was great derangement in

the money market, and stocks in general were much depressed. And considering that this stock had been subscribed for conditionally: it was thought most judicious by your Directors, and such subscribers to the stock, as they had opportunity of consulting, to delay this report, until business should assume in some measure its former prosperous condition.

The act of incorporation required the location of the Road to be filed with the proper authorities before the first day of June last. Recent acts of the commonwealth rendered it of the utmost importance that this act should be continued in force; accordingly application was made to the Legislature near the close of their last Session, and an additional act obtained extending the time of filing the location of their Road for the term of six months.

Your Directors will now proceed to exhibit their views of the probable income of the Road. The Lowell Rail Road diverges very much to the east of a direct line from Boston to Lowell, and in the northerly part of Woburn and southerly part of Wilmington it passes considerably to the east of the Boston and Haverhill Road. So that the Andover and Wilmington Rail Road will intersect it soon after it begins to take a more westerly direction, thereby forming a very direct Rail Road from Boston to Andover, of about twenty two miles in length. And it is believed that no route could have been located from the city of Boston more favorably to take the travel from the state of Maine and the easterly part of Newhampshire, than this.

The enterprising citizens of Haverhill are about getting a new Road opened from their town to Exeter, which shortens the distance between the two towns more than three miles and a half. It is understood that the upper Road from Portland to Boston, will then be about the same length as the lower Road from Portland to Boston through Newburyport, as it is usually travelled. It is also understood that the Road from Augusta through Gray to Dover is fifteen miles shorter than the Road through Portland. This would also have a tendency to

divert the travel coming from, and below the Capital of the state of Maine to the upper Road, through Haverhill.

There are sixteen stages daily, as we are informed, which pass between Newburyport and Boston. They are supposed to average ten passengers to a stage, making the number of 50,080 annually. Newburyport is twenty one miles from Andover, and it is probable that a Rail Road might be constructed from Andover down the Merrimac River to Newburyport, in about the same distance; which would make the distance from Newburyport to Boston by Rail Roads about forty three miles, which would be about six or seven miles only farther than the stage Road.

Your Directors having shewn what amount of travel may pass on this Rail Road from other and distant places; they now proceed to show you the amount of travel that will without doubt pass on it as soon as it is opened.—In doing this they state the number of stage passengers that have passed from and through this place to and from Boston, from Oct. 1, 1833 to Oct. 1, 1834.

In the Andover stage, exclusive of the way passengers, as per Way-bills	4,158
In the Haverhill company stages during the same time, as also appears from their Way-bills	8,706
The Derry stage, which is only one a day, but was formerly two, and is to be two again soon, as is understood, is estimated at nine per day, making during the same period the number of	2,817

Total number of stage passengers 15,681

The stage fare has usually been one dollar each way. Suppose the fare on the Rail Road to be seventy five cents, then this number of 15,681 passengers would amount to the sum of \$11,760 75.

The next item to be considered is the amount of Toll to be paid to the Boston and Lowell Rail Road Corporation, for running Cars over their Road.

Your Directors have no means of stating what this may be.

They have been informed from good authority, that the usual sum paid is about one cent per mile for each Passenger, and one half cent per mile per Ton for Goods. This item may be more, and it may be less. But from what is known of the liberal views of the officers of that Corporation, there is no reason to expect that an unreasonable sum will be required. They will undoubtedly consider it for their interest to encourage this branch to their Road.

The Tonnage which passes through and from this place to and from Boston, conveyed in the Baggage waggons which run regularly from Haverhill, Andover and Methuen, with some few other teams which go occasionally, has been estimated by consulting the owners of the waggons, some of their employers, and others who have means of judging of the amount conveyed, and is believed by your Directors not to have been overrated. It stands as follows—

From Andover	2,900 Tons
“ Methuen	1,500 “
“ Haverhill	1,300 “

Total . 5,700 Tons

This at four dollars per Ton, which is the usual price from this Town, amounts to . . . \$22,800 00

Fifteen thousand six hundred and eighty-one stage Passengers, at one dollar each, is . . . 15,681 00

Total amount paid from Oct. 1, 1833 to Oct. 1, 1834 for the transportation of goods, principally on Baggage waggons and for persons in the publick stages, is \$38,481 00

For the purpose of this calculation the Tonnage on the Rail Road is reduced to two dollars per Ton, which amounts to the sum of . . . 11,400 00

The fare for Passengers is calculated at seventy five cents, which amounts to the sum of . . . 11,760 75

Total . \$23,160 75

Toll to be paid to the Boston and Lowell Rail Road Corporation, at one half cent per Ton per mile, say fourteen miles, is	399 00
Toll to be paid as above for Passengers at one cent per mile each, say fourteen miles, is	2,195 34
Whole amount of Toll for the above number of Tons of goods and the number of Passengers as above, is	<u>\$2,594 34</u>

This last mentioned sum subtracted from twenty three thousand one hundred and sixty dollars and seventy-five cents, leaves, to meet all the annual expenses of the Road, the sum of . . . \$20,566 41

Your Directors have not been able to obtain, either from the Officers of the Providence or the Worcester Rail Road Corporation, the actual daily expense of running their locomotive Engines on either of their Roads. They have been, however, obligingly favored by the Officers of both these Corporations, with much information in regard to the Construction of their Roads, and also with several reports of their Directors and Engineers. At the close of one of these reports in a statement made by Mr. Henshaw is found an extract from a Report of the Baltimore and Ohio Rail Road Company, from which it is understood an experiment was made on that Road of substituting steam for horse power in the transportation of merchandize, and that the result was very successful—making a saving of more than one half—that this Engine performed its distance of eighty miles per day, drawing five Cars, weighing, loaded, eighteen Tons, at an average speed of twelve miles an hour; though it might have been driven at a greater speed.

The cost of Running this Engine is quoted as follows:

The daily cost of running the Engine to the planes will at the present high price of fuel probably be \$16, made out as follows:	
Engineer	\$2 00
Assistant	1 50

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 \$23,160 75

One Ton of Anthracite Coal	8 00
Oil	0 50
Repairs and Renewals	2 50
Interest	0 75
Contingencies	0 75

Total 16 00

For the purpose of this calculation your Directors have assumed this sum as the expense of two trips to Boston a day, with an Engine drawing all the necessary Cars for Goods and Passengers, making a distance of between eighty and ninety miles each day, at a speed of about twenty miles the hour, which amounts to the sum of . . . \$4,008 00

The interest on one hundred thousand dollars, is . . . 6,000 00

Salaries, labor &c. of Superintendent, Clerk, Warehouse men &c. is supposed may amount to the sum of 4,000 00

Repairs of the Road 2,000 00*

For other contingencies 1,000 00

Amounting to the sum of \$17,008 00

Which sum, subtracted from the above sum of twenty thousand five hundred and sixty-six dollars and forty-one cents, leaves, after paying all expenses and six per cent on the capital, the sum of . . . 3,556 41

Your Directors may have set some of these items of expense too high; perhaps others too low. Their means of obtaining information on this subject, has necessarily been somewhat limited. But should this project turn out to be more expensive than has been here calculated, there are no reasons why it should be abandoned, as only a part of the travel which will pass over this Rail Road has been brought into the calculation. Andover, Haverhill, Methuen, and Bradford are all flourishing agricultural and manufacturing towns. Farmers transport most of their produce, and manufacturers many of their commodities

in their own vehicles. Men of business often travel in their own carriages, and much travel must also come from other places more distant.

That Rail Roads are to be established between all considerable places in our country where the amount of business will justify the expense, is no longer an open question; experience has already settled it. So pleasant, cheap, easy and expeditious is this mode of conveyance, that it has preference over any other now in practice. This is proved by the fact, that the increase of travel between places where Rail Roads have been opened, has been very great.

The travel between Manchester and Liverpool is said to have increased *seven fold* since the construction of the Rail Way. The opening of the Baltimore and Ohio Rail Road increased the travel on that Route *ten fold*; and that was said to be about the usual increase of travel where other Rail Roads had been opened in that section of the country. The officers of the last mentioned Corporation in their late annual report say, "Under all these circumstances, speculation is no longer necessary. Facts now stand in the place of opinions—results in place of calculations. And upon a full and careful examination, the Board feel no hesitation in assuring the Stockholders that the completion of the work to its termination on the Ohio, upon the plan first contemplated, with a double track of Rails, is perfectly practicable within the original estimate of twenty thousand dollars per mile, excluding, in the average, the greater outlay upon the first division of the Road, and this too without the sacrifice to economy of any one requisite of durability and excellence."

"The adaptation of the Rail Road system to general traffic—that point so long disputed—has been fully and for ever set a rest. Every species of agricultural productions, lime, timber, lumber, fire wood, even paving stones, have been brought to Baltimore, with profit to those using the Road as a means of transportation for articles so bulky and so cheap; and in return, and at an enhanced toll, but with equally profitable results,

plaster of Paris, coal, boards, bricks, and scrap iron, have been sent into the interior. When articles so varied, and some of them of so small value, can be carried profitably to their owners, and to the Company, no doubt can exist as to the profits arising to both, on Merchandize and Passengers."

In conclusion, your Directors observe, if you persevere, and finish this Road, the property in this vicinity will be greatly enhanced in value. If you fail to do it, it will be greatly diminished. You cannot stand still—you will either advance towards the Capital, or you will recede. In the one case, you are within a few miles of Boston—in the other, the counties of Middlesex, Worcester, Norfolk, Bristol, and even the State of Rhode Island, are nearer the Capital than you.

All these facts, your Directors think of importance; and they trust that you will adopt that course which will best promote your own interest and the public good.

All which is respectfully submitted.

HOBART CLARK,
ABRAHAM MARLAND,
AMOS ABBOTT,
JOHN SMITH,
MERRIL PETTENGILL.

Andover, Oct. 21, 1834.

BOSTON, JANUARY 14, 1834.

TO HOBART CLARK, Esq.

President of the Andover and Wilmington Rail Road Co.

SIR: Having in compliance with your request undertaken the execution of the survey of a route for a Rail Road from Andover, to intersect the Boston and Lowell Rail Road—for the purpose of ascertaining approximately the probable cost of its construction, and the amount of capital required to put it in operation, I have now the honor to submit to you the following, as the result of those surveys, accompanied with a Map illustrative thereof.

The advanced state of the season in which the survey was commenced, and the necessity for despatch in operations in the field, precluded the possibility of making the proper examinations of the country to ensure the most judicious selection of the ground for the experimental line on which the estimate was to be based.

I think it necessary therefore to premise (and from the cursory examination I made of the intermediate country) I have no hesitation in saying that a Road might be located between Andover and the Lowell Rail Road, which in its construction would not cost within 8 or 10 per ct. of the amount herein estimated.

By reference to the map and profile, it will be perceived, that on the route surveyed, the valley of the small run near Goldsmith's house, and that of Chandler's Brook, present the greatest obstacles to an easy graduation of the Road, and in fact form the only barriers on the entire route to the formation of a road bed at the minimum expense of graduation.

For the purpose of diminishing the quantity of embankment over the valley near Goldsmith's, an experimental survey was made which is represented by the dotted line on the map, and it is my opinion that the development of surveys preparatory to a location, will enable a crossing of this valley to be made without making the route more tortuous than the most direct line run, or more expensive than the other; my estimate therefore will be based on this supposition. It will appear evident also from an examination of the topographical features of the country, that the expense may be considerably diminished at the crossing of the valley of Chandler's Brook, though here it will be indispensably necessary to make the road circuitous, to avoid the hill bordering the valley on the south side, through which it would be necessary to excavate to pursue a more direct route. The road, with the exception of this instance, which by no means presents a serious exception to its general character, may be considered unusually straight, and even in this case the curvature will not be so great as to render it necessary to retard the velocity of an engine operating with a proper rate of speed on a straight line.

The excavations necessary for the graduation of the Road bed, are generally of a loose nature, composed principally of gravel, sand and small stone, though in some instances considerable portions of rock will be encountered; this however is of a nature so well adapted to the different purposes of construction (consisting as it does of sienite and granite, and affording the best material for abutments of bridges, trench walls, and other purposes,) that rather than an obstacle, we may consider it a favorable circumstance.

The crossing of two or three swamps will be unavoidable on this route, which on a superficial view might be considered obstacles of a serious nature; but there is nothing in their character or extent to make it expedient to place other than embankments of the most simple kind over them, and those seldom of an elevation more than sufficient to protect the road from the effects of inundations which occur in the spring and fall.

As you desired, I have estimated for the formation of a Road bed of sufficient width for the laying of two tracks of Rails: yet I cannot conceive it possible that it will be found expedient at any time to lay more than one; for it appears evident to me that on a

road of this extent, the business could and should be so regulated, that one track with the necessary passing places, should fulfil every purpose for which the road is intended. I have therefore annexed an estimate also for a single track, by which it will be perceived that a considerable amount may be saved in the first investment.

I furnish you with estimates of the cost of laying rails on a foundation of rubble stone, or trench walls; as adopted on the Boston and Providence Rail Road where it has been considered necessary to secure against the action of frost. And one with a superstructure formed of longitudinal sills, which (from the peculiar nature of the excavations and embankments, and the probability of their being but little affected by frost) I am of opinion would answer on almost the entire route, as a substitute for the more expensive foundations of rubble stone, or trench walls, and from the facilities afforded for the readjustment of the rails, should they by settling of embankments or any accidental circumstance be deranged, may be preferred. The rails in either case to be secured and kept in position by transverse cedar sleepers, placed about 3 feet 9 inches apart, and notched for their reception, and to be made fast to each sleeper by strong iron spikes. The Rail in shape, similar to that used on the Boston and Providence rail Road, but lighter.

It was found necessary in order to make the most economical distribution of the excavation and embankment at Chandler's Brook, to have an ascent of about 14 feet in the grade of the road in going from Andover towards Boston, which is overcome in about a mile; with this exception the grades have an inclination from Andover, and vary from 1·2 to 25 feet per mile. The first grade (or stage,) descending 14 feet per mile, is $1\frac{1}{2}$ miles in length. The 2d, descending 23·6 feet per m., 1 mile 320 feet in length. 3d, ascending 14·7 feet per m., 4480 feet in length. 4th, level, 3120 in length. 5th, descending 25 feet per m., 1 mile. 6th, descending 6·66 feet per m., $\frac{2}{3}$ of a mile. 7th, descending 2·33 feet per m., $1\frac{1}{2}$ miles. 8th, descending 1·20 feet per m., one mile.

The total length of the Road is 8 miles, 1500 feet.

The total ascent and descent 93·45 feet.

To render the computations of the expense of graduation more clear and easy, I have divided the route into eight sections, in which the excavations and embankments are as near as the case will admit equalized, and have in the estimate only calculated for the expense of excavating or embanking according to the preponderance of either; making a due allowance in the price for the proportion of rock that may occur.

ESTIMATE OF GRADUATION AND MASONRY.

Section 1st.

9,050 cub. yds. of Embankment at 14 cts. \$1,267 00
Masonry for culverts and drains 60 00

Section 2d.

55,787 cub. yds. of Embankment at 17 cts. \$9,483 79
Masonry for culverts and drains 210 00
One Road bridge 600 00

Section 3d.

109,817 cub. yds. of Embankment at 17 cts. \$18,668 89
Masonry for Bridge over Chandler's Brook 1,000 00

Section 4th.

35,201 cub. yds. of Excavation at 14 cts. \$4,928 14
Masonry for culverts, &c. 200 00

Section 5th.

19,187 cub. yds. of Excavation at 16 cts. \$3,069 92
Masonry for culverts 45 00

10,553 cub. yds.
816 cub. yds.
Bridges and culverts

7,650 cub. yds.
68 do. do. at
Masonry for culverts

16,258 cub. yds.
294 do. do. at
4,246 do. do. at
Bridge and culverts

Total for Excavation
For clearing

ESTIMATE

707 tons
Iron spikes
1,410 c
Excavation
st
Dressing
Straight

To wh

Section 6th.

10,553 cub. yds. of Embankment at 16 cts.	\$1,688 48
4376 cub. yds. of Excavation at 14 cts.	612 64
Bridges and culverts	500 00

Section 7th.

8,650 cub. yds. of Excavation at 17 cts.	\$1,470 50
648 do. do. at 12 cts.	77 76
Masonry for culverts	75 00

Section 8th.

16,288 cub. yds. of Embankment at 17 cts.	\$2,768 86
994 do. do. at 12 cts.	119 22
4,246 do. do. at 15 cts.	639 00
Bridge and culverts	175 00

Total for Excavation, Embankment and Masonry . .	\$47,659 80
For clearing, grubbing, and side drains	2,000 00

ESTIMATE PER MILE, FOR LAYING ONE TRACK OF RAILS, ON FOUNDATION OF RUBBLE STONE OR TRENCH WALLS.

70.7 tons of iron edge rail at \$45	\$3,181 50
Iron spikes, 3,170 lbs. at 7 cts.	221 90
1,410 cedar sleepers at 20 cts.	282 00
Excavating trenches and filling the same with rubble stone or trench walls	1,440 00
Dressing and adjusting sleepers	320 00
Straightening, jointing and laying iron rails	320 00
Total . . .	\$5,725 40

Total for $8\frac{1}{2}$ miles of Rail way . .	\$48,665 90
To which add for necessary passing places	1,500 00

ESTIMATE PER MILE FOR LAYING ONE TRACK OF RAILS ON LONGITUDINAL SILLS.

70.7 tons of iron edge rail at \$45	\$3,181 50
Iron spikes 3,170 lbs. at 7 cts.	221 90
1,410 cedar sleepers at 20 cts.	282 00
10,560 feet of timber for sills at 4 cts.	422 40
Excavating trenches	240 00
Dressing and adjusting sleepers	320 00
Straightening, jointing and laying rails	320 00
Total . . .	\$4,987 80

Total for $8\frac{1}{2}$ miles of rail way	\$42,396 30
For necessary passing places	1,500 00

Aggregate Cost of graduation and masonry for a double track of Rails, and laying of one track on foundation of Rubble stone or Wall	\$99,825 20
Engineer and Agent's department and Contingencies	10,000 00

Total Cost . . . \$109,825 20

Aggregate of graduation and masonry for a single track, and laying one track of Rails on foundation of Rubble stone or Wall	\$83,271 90
Engineer and Agent's department and Contingencies	10,000 00

Total Cost . . . \$93,271 90

Aggregate of graduation and masonry for a single track, with a single track of Rails laid on longitudinal sills	\$77,002 80
Engineer and Agent's department and Contingencies	10,000 00

Total Cost . . . \$87,002 80

CORRECTION.

On page 14, for \$4,008 00, read \$5,008 00
“ “ “ \$17,008 00, “ \$18,008 00
“ “ “ 3,556 41, “ 2,556 41

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For two locomotive Engines, and the requisite number of passenger and freight cars, an expenditure of about twenty thousand dollars would be required, and I have no doubt that a capital of *One hundred, or One hundred and ten thousand dollars* will be found fully adequate to put the road in successful operation.

I have the honour to be,

Very respectfully, Sir,

Your obedient servant,

JOSHUA BARNEY.

CONDITIONS OF THE SUBSCRIPTION
TO THE STOCK IN THE
ANDOVER AND WILMINGTON RAIL ROAD
CORPORATION.

WHEREAS an Act has been passed by the Legislature of Massachusetts in incorporating Mark Newman and others with their associates, by the name and style of the Andover and Wilmington Rail Road Corporation, in which it is provided the capital stock of said Corporation shall consist of one thousand shares, on which no assessment shall be laid of a greater amount in the whole than one hundred dollars per share :

And whereas it is deemed important that the Corporation be organized forthwith, for the purpose of proceeding immediately to make and complete such surveys and estimates as may show the practicability and probable expense of the undertaking; and whereas it is deemed expedient that these surveys and estimates be had and reports thereon made before any assessment shall be made on the shares, except what shall be necessary to defray the expense of such surveys and estimates—

Therefore we the subscribers do hereby agree to take the number of shares placed against our names respectively; but on the following conditions, to wit.

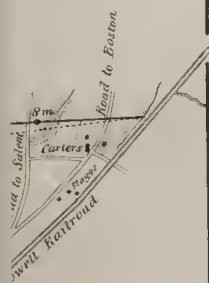
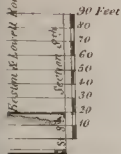
First, An assessment shall be laid of one dollar per share, and the funds so raised shall be at the disposal of the Directors, for the purpose of making surveys and estimates, and obtaining all such information in regard to the construction and probable income of the road, as may be deemed necessary to enable the stockholders to decide on the expediency of the undertaking.

Secondly, The Directors shall, as soon as may be, lay before the Stockholders the result of their doings at a meeting of the Corporation convened for that purpose, and duly notified in one newspaper published in Boston, and one in Haverhill, at which meeting, or within thirty days thereafter, any subscriber may, on giving notice in writing to the Treasurer or Clerk, abandon the whole or any part of his stock to the Corporation; whereupon he shall not be liable for any further assessment on the shares so relinquished; but if the Corporation shall determine to proceed in constructing the road, and said shares shall be subscribed for by others, he shall be entitled to receive back the whole amount of the assessment paid thereon; and if otherwise, to receive his proportion of any balance that may remain in the Treasurer's hands after the payment of all just claims on the Corporation.

The foregoing provisions shall be considered as original conditions, and fundamental by-laws, binding on the Directors, and all the Proprietors, and un repealable; and shall be passed in the form of votes, if that be hereafter thought necessary or proper.

Andover, May 28, 1833.

Profile of Lowell Road



CONDITIONS OF THE SUBSCRIPTION
TO THE STOCK IN THE
ANDOVER AND WILMINGTON RAIL ROAD
CORPORATION.

WHEREAS an Act has been passed by the Legislature of Massachusetts in incorporating Mark Newman and others with their associates, by the name and style of the Andover and Wilmington Rail Road Corporation, in which it is provided the capital stock of said Corporation shall consist of one thousand shares, on which no assessment shall be laid of a greater amount in the whole than one hundred dollars per share:

And whereas it is deemed important that the Corporation be organized forthwith, for the purpose of proceeding immediately to make and complete such surveys and estimates as may show the practicability and probable expense of the undertaking; and whereas it is deemed expedient that these surveys and estimates be had and reports thereon made before any assessment shall be made on the shares, except what shall be necessary to defray the expense of such surveys and estimates—

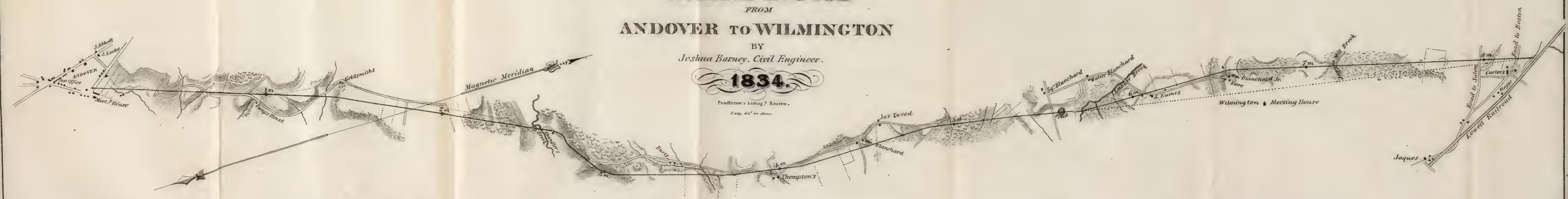
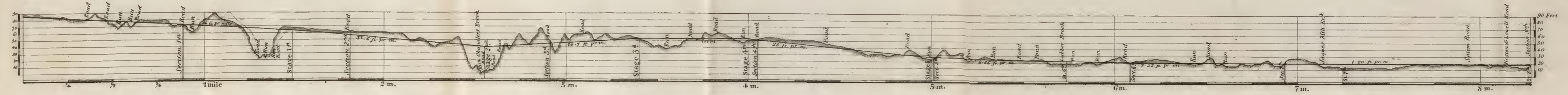
Therefore we the subscribers do hereby agree to take the number of shares placed against our names respectively; but on the following conditions, to wit:

First, An assessment shall be laid of one dollar per share, and the funds so raised shall be at the disposal of the Directors, for the purpose of making surveys and estimates, and obtaining all such information in regard to the construction and probable income of the road, as may be deemed necessary to enable the stockholders to decide on the expediency of the undertaking.

Secondly, The Directors shall, as soon as may be, lay before the Stockholders the result of their doings at a meeting of the Corporation convened for that purpose, and duly notified in one newspaper published in Boston, and one in Haverhill, at which meeting, or within thirty days thereafter, any subscriber may, on giving notice in writing to the Treasurer or Clerk, abandon the whole or any part of his stock to the Corporation; whereupon he shall not be liable for any further assessment on the shares so relinquished; but if the Corporation shall determine to proceed in constructing the road, and said shares shall be subscribed for by others, he shall be entitled to receive back the whole amount of the assessment paid thereon; and if otherwise, to receive his proportion of any balance that may remain in the Treasurer's hands after the payment of all just claims on the Corporation.

The foregoing provisions shall be considered as original conditions, and fundamental by-laws, binding on the Directors, and all the Proprietors, and unrepalable; and shall be passed in the form of votes, if that be hereafter thought necessary or proper.

Andover, May 23, 1833.



Survey
of a Route for a
RAIL ROAD
FROM
ANDOVER TO WILMINGTON
BY
Joshua Barney, Civil Engineer.
1834.
Tendleton & Lithog. Boston.
Edy. del. on stone.

